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Sprains of the Flexor Tendons.*

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The tendons of the flexor pedis perforans and the flexor pedis perforatus muscles of the horse are far more liable to sprain than all the other tendons of the body, due to the constant use and strain to which they are subjected.

In common with other tendons, they are more or less unyielding ropes of rough fibrous tissue, spread out to receive the muscle above, and being below continuous with the membrane investing the bone.

The surface of a tendon is as smooth as it is possible to be and glides without friction within its grooves and sheath, no matter how the position of the limb varies. The perforatus tendon receives the supra-carpal ligament and spreads out at the posterior portion of the fetlock joint to form a sheath for the perforans, which becomes attached to the solar surface of the os pedis, and receives the infra-carpal check ligament at about the upper third of the metacarpal bone.

CONFORMATION MOST SUBJECT TO SPRAINS.

Horses with long cannon bones and tied-in knees are perhaps most liable, especially if the pasterns are long and oblique, the toes long and the heels low. Other factors are big and heavy bodies, with under-developed limbs; tendons too close to the bone—especially if the bone is round, the skin thick, hairy and coarse, and the knees and fetlock joints small; under-development of the fore-quarters compared with the hind. Absolute thickness of tendon bears no direct proportion to its strength; on the contrary, tendons of considerable size and surrounded by loose tissue sprain more frequently than the sharply defined tendon. Working too soon after a debilitating disease is a predisposing cause. Tendonitis of a very painful type is occasionally seen as a result of influenza.

Many racehorses have permanent boots made of melton cloth sewn on to the legs. If it is desired to remove these, they should be loosened very gradually—a few stitches a day—otherwise the legs fill and are, I think, more liable to sprain.

With age, the tendons become stronger and firmer and less likely to sprain. Legs showing a varicose condition of the vein which runs from the inside to the outside, across the tendons, seem predisposed to sprain.

In racehorses, one of the most frequent causes of sprain is galloping the horse when he is too big, not fit, and urging him on when he becomes tired. It is seldom that we see a tendon sprained except when the horse is going as quickly as he can and is urged on to increased action. Generally, we may say the tendons are not sprained until the muscles become tired; then the muscles do not contract and relax normally, their elasticity is lost, and the tendon, being only slightly elastic, gives way. These we know as active strains. Now and then sprains are caused by the horse jumping about when he is quite fresh, or being suddenly and forcibly pulled up; here the sprain is caused by the muscles being out of control, and the non-elastic tendon bears the full weight of the body. These are passive strains.

In the first instance, of the two tendons, perhaps the perforatus or outer tendon is more frequently sprained, and, if one tendon only is sprained, there is as a rule little or no lameness, but the tendonitis usually spreads from one to the other.

NATURE OF THE INJURY.

The sprained area shows tenderness and fullness in a very few minutes after receipt of the injury, due to the tough, fibrous bands in the tendon being more or less ruptured and the effusion of inflammatory material into the spaces; the skin becomes hot and tender and there is more or less lameness. The extent of the lameness is not always in direct ratio to the after-effects of the sprain. The pain is due to the extravasation and effusion pressing on the nerve endings in the torn and bruised tissues.

INFLAMMATION AND THE PROCESS OF REPAIR.

Inflammation of the tendon, the result of a sprain, rarely remains limited to the area in which it begins, even when it is not severe and subsides early. Changes are left behind which, without proper treatment, are liable to receive further injury and become serious, for when once the fibres are ruptured, they never join together again. We see this particularly when a tendon is only slightly sprained, work is not eased and there are slight repetitions of the injury. The fibrous bundles are separated more and more by the exudate, the tendon becomes bowed and successful treatment is rendered more difficult, although I must admit it is sometimes very striking what effects continuous work has on sprained tendons.

* Paper presented to the Lancashire V.M.A. at Liverpool on November 29th, 1922.

We have seen horses kept at work with markedly sprained tendons and the injury gradually heals, without treatment. These are usually light, thin and, usually also, older horses.

Most frequently the first sprain affects that portion of the tendon midway between the knee and fetlock joint; this may be complicated by a sprain of the infra-carpal ligament. The actual damage varies from a slight enlargement, practically a filling of the tendon sheath, to an injury so severe that the tendon fibres are ruptured, including that portion of the perforatus which forms the sheath posterior to the fetlock joint.

Bruises and Sprains.

It is important, but not always easy, to distinguish between a bruise and a sprain. Generally with a bruise the swelling is more or less diffused, doughy, and pits on pressure.

Treatment.

As soon as possible, we should remove the shoe and place the animal on sawdust. This allows the leg to be rested as desired and the foot pressure is soft and springy.

We must first consider the very rapid effusion. The more the exudate from the vessels, the more there is to be ultimately absorbed or organised. By the effusion, the fibrous bundles are separated, consequently the tendon is weakened, and our aim should be to prevent as much exudation as possible. With this object in view, we use cold applications accompanied by well directed pressure for the first few hours. Cold water from a hose is directed up the leg for a few minutes. (It should be specially noted that the hose should be directed up the leg as the water will then run both ways, whereas, if directed down the leg, there is only the benefit of the water running one way). Afterwards cover with cotton wool, or gauze tissue, and bandage, but not too tightly. Evaporating dressing—wool soaked in ether—covered with oiled silk and bandaged, or the application of iced poultices for a short time, are satisfactory in the first stage.

In the second stage, when the effusion has stopped, we may apply heat to relax the walls of the vessels and relieve the tension of the fibres in which the nerves end. If hot water is decided upon, it is not a bad plan to place the limb in warm water and gradually raise the temperature as high as the animal can stand, taking care to stir the water to distribute the heat.

The dressing made of kaolin, glycerin, potass. iodi, methyl salicylate, menthol, etc., applied hot, is no doubt very useful, or application of warm ung. iodi may be tried, covered with gauze tissue and bandaged.

If massage is used, it must be done very carefully and towards the body. Covering the hair with cocoanut oil and a piece of paper, prevents bruising of the skin to some extent.

In the course of a few days, in ordinary cases, the pain has gone, but there is still some thickening, and one of the most annoying things about sprains is that they improve to a certain extent and then remain at a standstill. At this stage, we find the dressing—copies of the recipe of which I hand you, and which I have not put in the paper for obvious reasons—applied daily with a stencil brush to the tendons, covered with cotton wool and bandaged, tends to stimulate absorption of the lymph and assist in its organisation if imperfectly absorbed. This dressing we have used daily for fifty or sixty applications. A thick crust appears, which should not be removed, in the leg, and the animal may be worked, if desired. We have excellent results from this treatment and use it in preference to blistering in some cases, but, if blistering is decided upon, perhaps the best method is to apply 1.6 ung. hydrarg., cover the leg with wool and bandage, leaving it untouched for a fortnight.

In cases where firing is considered advisable, the cautery may be employed lightly in the form of "matt" firing, *i.e.*, a large number of small confluent spots, to, of course, the heavy line or deep spot firing. When a blistering ointment is applied afterwards, a proportion of tereb. Venet. may be added to it. This causes a strong thick scurf to form on the leg. About a month after firing, a charge composed of resin, cera. flav. and pix Burgundy, with lead oxide or ung. hydrarg., is frequently satisfactory.

Following firing in the racehorse, walking exercise is an advantage. The animal should be kept as light as possible, the less weight on the tendon the better.

We must always remember that whatever remains as the result of a sprain is an effort of nature to strengthen the weakened part and to repair the damage. In our treatment we should have the following objects in view:—

To organise the lymph.
To harden the tendon.
To thicken and tighten the skin.

As to the "legs" which are most likely to "stand," all other things being equal:—

1.—Thickened tendons caused by external injuries, such as over-reaches, are as a rule most satisfactory.
2.—Then a uniformly thickened tendon without sprain of the check ligaments.
3.—A firm "bowed" tendon, with a thickening of the sheath formed by the perforatus tendon at the posterior portion of the fetlock joint.
4.—A less firm "bowed" tendon.
5.—A soft "bowed" tendon complicated with sprain of the check ligament is least likely to "stand."

My remarks principally relate to the racehorse and the hunter, but I should be very pleased if the discussion would extend to this condition in the heavy horse.

Discussion.

In opening the discussion following the paper, Mr. Eaton Jones stated that he had listened with great pleasure to Mr. Edwards. He could not speak from much actual experience of hunters and racehorses, but he could give some idea of sprains in heavy horses. This condition has always been the "bugbear" of heavy horses in Liverpool for years, and he had at least 75 per cent. of all lamenesses in

his stud caused by sprain of the tendons. This condition was invariably found to occur at about the upper third of the cannon bone. He quite agreed with Mr. Edwards' remarks about conformation, and, indeed, thought this disability had a great deal to do with conformation. He was of opinion that a common bred horse with round bone was more liable to be affected than a flat-boned animal with a lot of tendon behind it. He also believed that in a great number of cases, constitution had a great bearing upon sprain of the tendon or a condition similar to sprain, for instance, rheumatism; and 50 per cent. of the cases of horses affected were, in his opinion, due to rheumatism. In these cases, the animals were found, as a rule, unthrifty, gradually beginning to lose condition, and anxious to lie down.

Bedding also, he thought, played a part in the condition of the tendon, similar to that of sprain. It had been found that horses bedded on moss or sawdust —either or both—began to " bank up," stand on their toes, and come out stiff in the morning. On first getting up, they appeared unable to stand, but whether those conditions were due to some sprain in the tendon, or to the uneven surfaces of the flooring, or even to rheumatism, it was impossible to say. When, however, there was rheumatism, they usually found those conditions at the same time. He felt sure that a lot of practitioners imagined that the caulkings and spurns had a detrimental effect in regard to sprain, but he had found that horses doing the heaviest work and shod in this way suffered the least.

With regard to treatment, he was afraid he had not gone as deeply into the question lately as the subject deserved, but he endeavoured first of all to allay the acute inflammation by means of cold water bandages, arnica, etc., and afterwards to apply the firing iron as speedily as might be. One friend of his, controlling a large number of racehorses, reduced the acute inflammation, fired with either strong acid or the iron, strapped the unaffected leg up, and made the horse stand on the injured limb for the whole period of treatment to prevent, as far as possible, any contraction of the tendons. He understood that he found this treatment very satisfactory. Mr. Eaton Jones also stated that if he found that, after firing the horse and it had resumed work, there was a tendency to go on the toes again, should he be a valuable animal, he was sent on to the land for a time and a flat shoe put on and then subjected to a course of ploughing. This had had a good effect on many he had had under his treatment. Should it be impracticable to send horses out to the land, a flat shoe and a bar pad had done well in a great number of cases.

Mr. MAYALL expressed his great interest in Mr. Edward's paper. He thought a great many practitioners believed more in cold applications in cases of sprains, the reason being that the tendons were not highly organised from a blood vessel point of view, but, at the same time, he thought the pain was counteracted to a great extent by warm applications. The prescription furnished by Mr. Edwards appeared to be a rather elaborate one, but he supposed it had stood the test of experience, and a big experience, too, he felt sure. At the same time, he stated he had very good results with the old prescription—well-known to everybody—viz.: Ammon. chlor., nitrate of potash, and, perhaps, a little camphor. He had seen surprising results with this old solution. He had often wondered why one always put high heels on contracted tendons, it only seemed to palliate the condition and did not remedy it. It seemed to him the best method was to get the ligament well stretched and to make the horse put his foot on the ground. In horses in town it appeared to be generally a condition in the hind leg and caused the animals to go over on the fetlock when the foot touched the ground. He had had cases where the tendons at the back of the leg did not seem to be affected. When he was a pupil with the Chairman's father, the latter often mentioned the fact that round bone and contracted tendons went together. He thought that in many cases this statement was correct. Mr. Mayall also stated that practitioners residing at the seaside had found that sea bathing had done a great deal of good in cases of sprained tendons. He stated that when he was in Norfolk, where there was a large amount of hunting, he saw a great deal of sprained tendons, and the method adopted there was to bandage permanently with plaster of Paris bandages and at the end of the season an examination was made when the bandages were removed and it was invariably found that the animals were again fit.

Mr. SUMNER joined with the other speakers in thanking Mr. Edwards for coming forward and reading his paper. He quite agreed with all Mr. Edwards said about conformation in relation to sprain. He would go further and say that family had a great deal to do with it, and not only family, but the district from which the particular breed of horse was produced, and the latter had a large part to play in rendering tendons less liable to injury. He always thought, however, that there must have been something going on before an actual rupture took place, and possibly a careful man would know by the feel of the limbs whether a horse should be stopped work or not. He believed there was a certain amount of " touchiness " before the actual rupture took place. Regarding the inflammatory products, the swelling which arose, he took it there might be the tendon swelling and the swelling associated with the sheaths, but Mr. Edwards did not say what these inflammatory products were and what the usual results were. It had always troubled him a great deal as to what it could be. However, an opportunity arose in the case of a Grand National horse which broke its leg and he had an opportunity of examining its tendons, and in one there was hæmorrhage. He thought the vast majority of those conditions were due to hæmorrhage and he looked upon it as a very bad condition to be dealt with, and the methods of cure should be directed to this end. He agreed with the remedies suggested, but he did not, at the same time

agree as to the advisability of applying cold applications on to recent bruising or sprain. His feelings were certainly on the opposite side with the idea of allowing these vessels to relieve themselves before they could set up any repair. He believed there was nothing comparable to the cautery, but unless the new tissue was as strong as the tissue which unfortunately gave way, the affected leg would continue to give trouble. He knew of several cases in town practice in which the cautery had rendered the animal a serviceable beast over a very long period of years.

In heavier horses they got a contracted tendon very much more frequently than in the lighter breeds. Regarding Mr. Mayall's remarks, they sometimes saw a shortening of the tendon and when examined, the tendon got thinner and thinner and still went on shortening. What that condition was one could not say. Contraction occurred after the definite sprain and after that more contraction was observed without their being able to define any lesions or any abnormality in the tendons themselves. The relationship between the digital infirmities and flexor tendons was a very close one. They experienced digital troubles, sidebone, ring bone, etc. and other infirmities which frequently were the precursors of the giving way of the check ligaments and, whenever he found the latter, he always looked about to see whether it was associated with a digital infirmity, and, in nine cases out of ten, he found it was a digital infirmity which was sufficient to have brought about the pressure on these. Regarding the influence of bedding, he stated that he used to talk to boys about stable management. He had a deal to say about flooring. In one particular instance, he had a lot of light-legged horses going on their toes behind. The animals had frequently to be put out to grass and in the end the idea was advanced that these tendons became contracted through the animals standing on what appeared to be a very deep groove in the stable. Eventually the grooves were levelled and the tendon trouble ceased to exist. Another point, he stated, was that of mechanical means of stretching the tendons, and if they had a disordered tendon and there was likely to be a secondary contraction of the tendon, they placed the animal on toe leverage—sometimes to the extent of from 1in. to 1½in.—and actually increased the leverage, with the idea of bringing about contraction; that had done a great deal of good and they had then reverted to the ordinary method of shoeing, but, he was sorry to say, that while successful in some cases, the cure had not been permanent. Mr. Sumner concluded by remarking that he was a firm believer in firing.

Mr. PILLERS said he wished to support the observations of Mr. Eaton Jones regarding the frequency of sprain in town horses. He could safely say that, as far as the Liverpool Corporation was concerned, sprained tendon was all too frequent in the stud, and it was a serious condition, as it lessened the efficiency of a large stud very considerably. It was the most important disability that had to be dealt with. Other diseases could be kept in check, but sprained tendons could not be in town horses. This also was the experience of the late lamented Mr. Malcolm, in Birmingham.

The CHAIRMAN then passed round for inspection some X-ray photographs of a polo pony which, during the war, was turned out and did nothing. It was about fourteen years of age and when brought up to start to play, was found to have an inflammation just by the check ligaments. It was treated with hot water and heat generally and came all right, but after playing about a week the condition recurred and in the last two years had recurred six or seven times. The photographs did not reveal the cause of the trouble. The photographs were passed round for inspection, and in the meantime, the CHAIRMAN called upon Mr. Edwards to reply to the discussion.

Mr. EDWARDS thanked the gentlemen who had been kind enough to discuss the paper. Mr. Eaton Jones had said that rheumatism was one of the causes of sprained tendons. He thought, perhaps, it had a bearing upon it, but not very frequently. As for the standing on the affected leg for a period of weeks, it seemed a long time to him. He had known it for a fortnight, but a longer period than that seemed too much. This, of course, was to prevent any contraction. Mr. Mayall spoke about an elaborate prescription. He was afraid that was so, but as far as his experience was concerned, it had acted very satisfactorily. Regarding ring bone and contracted tendon in heavy horses, these always seemed to go together. Sea bathing was very excellent for the legs, as also were plaster of Paris bandages. He had tried the latter, but they had not been very satisfactory with him. He stated that he must thank Mr. Sumner for his remarks about family, in which there was a great deal. As to the inflammatory products he could not say anything more than had Mr. Sumner. Whenever he had made a *post-mortem* he had found there was a certain amount of hæmorrhage into the tendon. Regarding the remarks that contraction of the tendon seemed more liable in heavy than in light horses, he should think than something in the action of the former affected that. A cart horse put his leg forward, went on his toe, and flexed the fetlock joint, allowing the tendon to contract. He was also of the opinion that there was nothing comparable with firing.

Eradication of Glanders.

In the report of the Chief Veterinary Officer for 1921 is recorded one of the outstanding successes in the operations of the Ministry of Agriculture in the treatment of animal diseases under the Diseases of Animals Acts. It is the almost entire elimination of Glanders or Farcy.

Before the passing of the Glanders Order of 1907 only horses showing clinical symptoms of the disease were slaughtered. That Order, however, laid down as an additional basis for diagnosis, the mallein test, and Local Authorities were empowered to apply that test to any suspected horse, ass or mule. They were

required to slaughter all animals reacting to the test, as well as all animals showing clinical symptoms of the disease. The reduction in the number of outbreaks year by year since the Order of 1907 came into force (1st January, 1908) affords striking proof of its efficiency. In 1907 there had been no less than 854 outbreaks of the disease, affecting 1,921 animals in Great Britain. In 1922 only four outbreaks were recorded for the year.

The Ministry have now issued a circular letter to all Local Authorities, who are empowered to deal with animal diseases, stating the fact that the Ministry is satisfied that Glanders has now been almost entirely eradicated from the country, but that in order to enable it to announce the freedom of the country from the disease with greater confidence when the proper time arrives, it is desirous of being furnished by Local Authorities with the fullest and most accurate information in regard to all future outbreaks, including the supply of specimens of the affected organs for confirmation of diagnosis at the Ministry's Veterinary Laboratory.

Cruelty Conviction for Milk Over-stocking.

At the Kidderminster Borough Court recently, William Oliver Attwood, farmer, Aveley, was charged with causing unnecessary suffering to a cow by allowing the udder to become overstocked with milk.

Mr. J. H. Thursfield appeared for the prosecution and Mr. H. G. Ivens for the defence.

Inspector Hargreaves said he was in the Cattle Market on the 12th December and saw a number of cows, one of which could scarcely walk and appeared to be in pain. The cow was restless. He fetched Mr. Conchie, who examined the cow and extracted some collodium—which was a substance which formed new skin.

Attwood then came on the scene and asked, "What is the matter ? " Witness replied that "the cow was overstocked with milk and in pain." Defendant replied it had only calved a week before. Defendant said the cow had been milked at five o'clock the previous night. The cow was ordered to be milked and the milking went on till one o'clock. Notices had been posted in the market, and it was cruelty to leave a cow unmilked for twenty hours.

Mr. J. W. Conchie, F.R.C.V.S., said the udder was overstocked and the teats were full and had been sealed up. The cow was in pain, and he advised the milk should be drawn from the cow at once. It was not at all natural to leave a cow unmilked from 5 till 11 next day.

William Oliver Attwood said he sold on an average 400 cows per year. The cows' normal milking hours were 9-30 in the morning and 4-30 in the afternoon. The cow had a large bag and was an easy milker; the valves of the teats were defective and the collodium was put on at 9 o'clock before coming down to market to keep the milk from being wasted.

In answer to Mr. Thursfield, witness said most dealers used the collodium. The cow was sold, but witness asked for the cow back again as a precaution against proceedings. The cow was with others at the time, and with the exception of having a bigger bag was no different from the rest.

Geo. Ernest W. Haywood, Stourport, dairyman, said he "drew" the cow in question and she never flinched, and he did not consider it over-stocked.

Frederick John Thomas, farmer, Elmley Lovett, said he had a good look at the cow and did not see anything the matter with it. It had a large udder, and some cows were easy milkers, and before taking them to market they would put collodium on the teats to prevent the milk being wasted. His view was it was no hardship to have cows unmilked from 5 in the evening till 11 next morning.

Wm. Perry, The Hawthorns, Quinton, Birmingham, said he attended markets for milking cows—he had done so all his life—and could tell to half a pint what he had in his pail. He milked the cow in question at 12-45, and the quantity obtained was ten quarts. The cow gave no indication of being overstocked, and the quantity taken was as usual after being four days since calving.

Other evidence for the defence having been given, Mr. Horace W. Stevens, M.R.C.V.S., said at 12-30 he was asked to go to the Cattle Market when he saw the cow with the Inspector standing by. The udder, after the milk had been drawn, was firm and fleshy. The general appearance of the cow gave no indication of pain. He took the temperature, which was 102·1—normal for a recently-calved cow. The excitement would account for an increased temperature, which was no indication of pain. The yield of 10 quarts was quite normal. At Mr. Attwood's request he visited the farm on December 27th, and saw the cow milked at 4-30. He went the next morning also, when the yield was 12qts. 1 pint. It would be absurd to say the cow was overstocked with ten quarts. It was a proper thing to stop the waste of milk by applying collodium, and the latter could easily be sucked off by the cow.

Dr. Stretton : Would you expect a cow to give the same yield four days after calving as it would 28 days after ? Yes.

Would a cow with a fleshy udder most likely suffer pain from the udder being distended ?—Possibly it would.

The Chairman said the Bench had unanimously decided to convict, and defendant would be fined £5, with £1 16s. 6d. costs.

Notice of appeal was given.—*Kidderminster Shuttle.*

Contagious Scheduled Diseases in 1922.

The official approximate figures which are now available concerning the scheduled animal diseases present several notable features.

Glanders.

In the first place, glanders and farcy, a disease once fairly common, has been reduced to four outbreaks, involving in each case one horse. In 1919, 1920, and 1921 there were 25, 15, and 11 outbreaks, with 61, 25, and 45 animals attacked respectively. It is therefore fairly safe to say that, thanks to legislative control, the disease will soon be stamped out. Not many years ago it was a serious menace to horses in the stables of our large towns and in coal mines.

Rabies.

In 1919, 1920, and 1921 there were 155, 41, and 23 cases of rabies respectively. All but six of these were in dogs. In 1922 there was only one case. Rabies was a war legacy, undoubtedly introduced by the clandestine importation of dogs from abroad during the last year or so of hostilities. The widespread orders for muzzling and the restrictions on the movement of dogs seriously affect the dog lover, sportsman, and farmer; but these measures are justified in view of the terrible nature of the disease when contracted by man from a rabid dog's bite. Without fresh invasions from abroad our pre-war immunity should be continued.

Anthrax.

In regard to this disease there is very little improvement over 1921. The number of outbreaks, viz., 515, is the same, but the number of animals (592) attacked is 57 less. The fact that the number of outbreaks in 1919 (234) increased to 459 in 1920 and 515 in 1921 may be regarded as indicating a halt in the yearly increase. Whether this will be maintained remains, of course, to be seen. Like glanders and rabies, anthrax derives very considerable importance from the fact that it is easily contracted by human beings, especially butchers and others who attempt to bleed or dress cattle showing need of quick slaughter.

Foot-and-Mouth Disease.

1922 will long be remembered for the worst experience of this disease since the early 'eighties. There were no fewer than 1,139 outbreaks, involving the slaughter of 55,565 animals as diseased or exposed to infection. The recent report of the committee appointed to enquire into the whole affair does not afford much comfort, save to show how rigid control and early reporting would have greatly minimised the losses. Every stock owner is interested in this subject. No doubt had everyone at once reported to the police the rumours that they heard, things would have been different. In a national cause such an action is a duty and not a matter to be dismissed as not one's business.

Parasitic Mange.

This skin disease of horses shows a most satisfactory reduction in prevalence, as is shown in the following table:—

Year.	Outbreaks.	Animals affected.
1919	5,003	9,773
1920	3,551	5,778
1921	2,055	3,108
1922	1,025	1,442

During and just after the war the disease was seriously on the increase. The steady and substantial decline each year since 1919 shows, however, that it is now well in check, and, given the same attention during the next few years, there is every likelihood of the reduction being continued until the menace, as it appeared in 1919, has been completely controlled. Although country areas do suffer, the disease is essentially one found in large towns, and it is the commercial intercourse in connection with grazing and cart horses which considerably helps the appearance of the disease on farms.

Sheep Scab.

This disease shows a jump from 476 outbreaks in 1920 to 757 in 1921. Last year there were 661 outbreaks: that is to say, a reduction of 96 affected premises. An increased effort is being made to get this disease under control, so that the decline may be regarded as satisfactory. There is still much opposition to double dipping, and great leniency is shown by country magistrates in cases where there can hardly be any doubt as to offences, unassociated with double dipping. However, a little more "moral duty," a few heavier fines for wilful offenders, and a continued annual reduction of 100 outbreaks for half-a-dozen years would practically see an end of all double dipping and movement orders.

Swine Fever.

The figures for 1922 are 1,390 outbreaks, with the slaughter of 529 animals as diseased or exposed to infection. In 1921 there were 1,285 outbreaks, with 462 animals slaughtered. With the abandonment of the issue of the serum, and no method of active immunisation to take its place, it can only be said that the position with regard to this disease is as unsatisfactory as ever.— *Agricultural Gazette.*

Foot-and-Mouth Disease.

Outbreak in Cheshire.

At a period when the stock-breeding farmer believed the country to be clear of disease, and at a time when there promised to be a revival in our trade abroad among pedigree cattle, sheep, and pigs, this dreaded disease has, says the *Daily Telegraph*, made its reappearance in a dairying and stock-rearing part of Cheshire, to wit, Handley, a village famous for its fine farming—and its foxes. It is feared that all market auctions and farm sales over a wide area will be stopped. Several animals have been slaughtered, and all movement of stock in the area has been prohibited.

All hopes of the ports of the world being declared open to English-bred stock are now lost for three months at least. The usual precautionary measures of stopping the movement of stock and the suppression of markets and farm stock sales have been taken, and Cheshire farmers of to-day are indeed suffering some of the pangs their fathers did when an even worse disease than "foot-and-mouth" raged throughout the county. Then cattle were burned and buried where they fell, and many agriculturists were financially crippled and some entirely broken as the result of their losses.

The High Commissioner for the Commonwealth of Australia has informed the Ministry of Agriculture that the embargo on the importation into Australia of dogs from Great Britain and Ireland has been lifted. Such dogs will now be admitted into the Commonwealth, subject to the production of certificates in the terms prescribed by the quarantine regulations, and to 180 days' quarantine on arrival in Australia.

The Veterinary Record.

17th February, 1923.

N.V.M.A. SECRETARYSHIP.

At a meeting of the Council of the National Veterinary Medical Association, held at 10 Red Lion Square, on February 12th, Mr. G. H. Livesey was appointed acting General Secretary and Chairman of the Editorial Committee until the Annual General Meeting. Major Simpson and Major Dunkin were co-opted to the Editorial Committee, which thus consists of Messrs. G. H. Livesey (Chairman), J. Willett, J. B. Buxton and Majors P. J. Simpson and G. W.Dunkin.

Our Advertisement Office Address.

We would again draw the attention of our readers to the important alteration, notified in our advertisement columns, that all communications respecting advertisements must now be addressed to the Advertisement Manager, 12 Buckingham Palace Road, S.W.1, and **not** as formerly to Holliday Street Wharf, Birmingham.

Bacterial Death.

An interesting controversy is at present engaging the attention of bacteriologists. Its subject is a theory advanced by Dr. d'Herelle, of the Pasteur Institute, to explain the fact that bacteria may suddenly dissolve when brought into contact with tissue fluids.

According to this theory, the reason of the dissolution is attack by still smaller organisms which are invisible under any known microscopic power. In short, even germs themselves may be attacked by other germs, and fall sick of diseases peculiar to themselves.

This theory has been tested by several observers, and notably by Professor Bordet, of the Pasteur Institute, of Brussels, whose recent lecture on the subject at Edinburgh is printed in the current issue of the *British Medical Journal*. Professor Bordet offers an alternative explanation of the observed facts, suggesting that, owing to some disturbing factor, germs become unwell and develop a chemical poison within their own "bodies." This is transmitted from generation to generation, and so the phenomenon of bacterial death is produced.

Neither theory has been proved; neither has been disproved. That both are of great interest and importance, however, is sufficiently obvious.—*The Times.*

Association Reports.

Midland Counties Veterinary Medical Association.

THE DUCTLESS GLANDS AND INTERNAL SECRETIONS.

The quarterly meeting of this Association was held at the Imperial Hotel, Birmingham, on Thursday, November 30th, when there was an unusually large attendance. Mr. Brennan De Vine occupied the chair, and there were also present, Messrs. F. L. Gooch (Stamford), H. L. Pemberton (Bridgnorth), J. Cormack (Coventry), J. O. Powley (Sutton Coldfield), W. H. Brooke (Handsworth), H. Tudor Hughes (Oswestry), L. C. Tipper (Birmingham), H. B. Hiles (Worcester), F. O'Neill (Birmingham), J. A. McLauchlan (Stourport), T. Slipper (Sutton Coldfield), H. F. Powell (Coalville), W. F. Ison (Atherstone), A. B. Forsyth (Cannock), J. Robertson (Stourbridge), C. J. Clifford (Shifnall), J. Martin (Wellington), G. Howie (Birmingham), G. A. Banham (Stratford-on-Avon), W. F. Aston (Ludlow), J. M. Whyte (Tenbury), R. P. Holmes (Birmingham), J. Young (Birmingham), F. O. B. Taylor (Stratford-on-Avon), S. M. Woodward (Birmingham), H. W. Dawes (West Bromwich), R. H. Over (Rugby), E. Beaumont (Bishop's Castle), W. J. Dale (Coventry), W. White (Birmingham), J. W. Conchie (Kidderminster), R. L. Green (Dudley), and the Hon. Sec. (Mr. H. J. Dawes, West Bromwich).

The visitors present included Sir H. Fairfax Lucy, Drs. T. C. Graves, J. Stanley White, R. Woolsey Stocks, A. J. O'Sullivan, Messrs. G. H. Livesey, James Blakeway, Robert Smith, F. E. Somer, J. N. Knighton, G. H. Nix, W. G. Crofts, Chris. Richards, and A. Ailwin Berry.

Apologies for absence were announced from the following:—Sir John McFadyean, Sir Stewart Stockman, Sir Gilbert Barling, Mr. H. Sumner (President R.C.V.S.), Professors Penberthy and Hobday, Drs. Robertson, Hirst, Winfield, Peel, Dain, and Johnstone, Messrs. R. Lake, H. Kirk, R. Cockburn, H. S. Cockburn, J. B. Buxton, R. C. Trigger, F. Hall, F. Ringer, J. J. Crowhurst, F. G. Edwards, F. Aulton, W. Trigger, M. Tailby, J. W. Brittlebank, W. Tart, A. G. Elder, H. Duckworth, R. Prince, W. Scott, T. J. Brain, L. W. Heelis, H. Fairer, F. V. Steward, T. Spencer, D. Forwell, W. L. Gascoyne, E. T. Pearce, J. Hoddinott, C. S. Hunting, R. L. Phillips, C. J. Byner, H. S. Reynolds, W. Grasby, F. T. Allen, R. Mackenzie, R. Thompson, J. R. Carless, J. Martin, jun., E. Franklin, R. E. Morrison, H. C. Reekes, R. Hughes, R. Wooff, P. P. Palmer, T. H. Hobson, G. P. Male, H. A. Turner, C. T. Parsons, J. A. R. Jones, Geo. Eaton, P. M. Evershed, J. C. DeVille, A. W Findlay, W. T. Olver, M. Sadler, and others.

The minutes of the previous meeting were read and confirmed.

Nominations and Elections.

The Hon. Sec. nominated for membership of the Association, Mr. A. G. Elder, 81 High Street, Tewkesbury.

Mr. Howie nominated H. W. Steele Bodger, of Tamworth.

Mr. Brooke nominated Mr. T. G. Marriott, of Northampton.

In the case of Mr. Elder, the Hon. Secretary stated that he would have attended this meeting had he not been laid aside by illness, and it was resolved to send him a letter of sympathy.

Two new members of the Association were elected, namely, Mr. C. W. Loy, of Ludlow (proposed by Mr. Aston and seconded by the Hon. Secretary); and Mr. J. A. McLauchlan, of Stourport (proposed by the Hon. Secretary and seconded by Mr. Robertson).

Report of Council.

The Hon. Secretary reported that a meeting of the Council had been held earlier in the day under the presidency of Mr. De Vine, when there were also present, Messrs. Gooch, Ison, Powley, Cormack, Martin and Forsyth. It was recommended that the next quarterly meeting be held at Birmingham, and that the subject for discussion be clinical cases brought forward by members. The Hon. Secretary had reported also that the summer picnic had been a great success.

On the motion of Mr. Conchie, seconded by Mr. Clifford, the report of the Council was adopted.

The Royal Sanitary Congress.

Mr. Powley reported on the Congress of the Royal Sanitary Institute at Bournemouth during the summer which he attended as a delegate from that Association. He apologised for the delay in giving his report, but it had been unavoidable. The Congress agenda contained much that was interesting to the Veterinary Profession, the veterinary section being under the presidency of a gentleman well-known to them all, namely, Mr. W. Woods, of Wigan. They had two very full days devoted to papers and discussions, the five items on the agenda of particular interest to veterinary surgeons being: (1) Swine Fever, its Economic and Hygienic Importance, by Mr. E. Whitley Baker, of Wimborne; (2) Discussion on the recent outbreak of foot-and-mouth disease; (3) Discussion on the provision of safe and effective instruments for the slaughter of animals for human food; (4) Meat Inspection; and (5) The Incidence of Anthrax. The last-named subject was one which he (Mr. Powley) had the honour of introducing. The various papers had been fully reported in the professional journals, which would relieve him of the necessity of referring to them in detail. The attendances at the different meetings were bigger than he had ever known them. He thought the Veterinary Profession was well advised in being represented at scientific gatherings of this character, and it would be a great mistake if they failed to identify themselves with an important body such as the Royal Sanitary Institute. He thanked them very much for appointing him a delegate to the Congress.

The President moved a vote of thanks to Mr. Powley for having represented the Association at the Congress and for his report on what took place. He agreed that it was in the highest degree important that an Association like theirs should keep in touch with events by affiliating with the Institute. It was very desirable that they should bring the politics of their profession before the scientific and also the lay world, and it was only by being represented adequately at gatherings like the Royal Sanitary Institute that they could hope to do so. He was glad to see that meat inspection had been discussed, and until they could get the Tuberculosis Order re-introduced he was afraid they would not be able to make the headway they all desired in the eradication of the disease.

The vote of thanks was seconded by Mr. Gooch, who asked what steps were taken to give effect to the decisions arrived at by the Congress.

The vote of thanks was carried, and

Mr. Powley, in acknowledgment, said the various resolutions adopted by Congress came before the Council of the Institute who, at their discretion, forwarded them to the Government Departments, or to the individuals concerned. He did not see what else they could do.

The Ductless Glands and Internal Secretions.

Dr. T. C. Graves, M.D., B.S., B.Sc., F.R.C.S., L.R.C.P., M.R.C.V.S., read the following paper on "The Ductless Glands."

I have to thank you for the honour you have conferred on me by inviting me to read a paper before your Society and I trust the subject I am introducing for discussion will elicit information and observations which will be of material use to us all, and may suggest studies which may eventually enable us to solve the causation of some obscure diseases.

The anatomy, physiology and pathology of the ductless glands is an enormous subject, and in the time at my disposal I can but indicate a few points which I hope will prove of interest. The subject should be attractive if only for the following reasons:—

Observations on the functions of these glands have been made largely from noting the effect of injury on removal of the glands in animals—experimental pathology.

Modern therapeutic preparations containing extracts of these glands are obtained from animals; the demand for these will probably increase and the services of comparative anatomists may be required in this connection.

It has been from time immemorial the custom to remove the reproductive glands in order to improve the quality of meat from animals bred for food purposes.

It has, during recent years, become the practice to remove these glands when it is suspected that they

are diseased in certain animals showing uncontrollable emotional disturbances. On this branch of the subject I am hoping to obtain first-hand information from members.

Many other reasons might be given, but we will now pass on to consider the definition of an internal secretion.

Swale Vincent says the process of internal secretion consists in the preparation and setting free of certain substances of physiological utility (the raw materials for which are supplied by the circulating blood) by certain cells of a glandular type; the substances set free are not passed out on to a free surface, but into the blood stream. The ductless glands include some glands which also have ducts and have a secretion other than internal, such as the pancreas and the reproductive organs.

Let us consider the pancreas.

The first conception of the pancreas is that it is a gland in the abdominal cavity which manufactures the pancreatic juice, but the pancreas has in its tissue portions which, on microscopic section, stain differently to the rest, these parts being known as the islets of Langerhans. Professor Schafer was the first to suggest that these islets are the part of the pancreatic tissue concerned with carbohydrate metabolism. A number of recent observers have found in diabetes mellitus that the islets are effected by a hyaline degeneration, atrophy, or inflammatory changes; but others have been unable to confirm these results. Nevertheless, a large number of pathologists favour the view that these islets constitute a special tissue whose function is to control, by means of some kind of internal secretion, the metabolism of sugar in the body.

I now proceed to quote largely from an article in the November 4th number of the *British Medical Journal*, by Professor MacLeod, of Toronto, on Insulin and Diabetes.

Insulin is the name given to a body extracted from the pancreas under special conditions. Dr. F. G. Banting suggested that extracts from a gland rendered degenerate by tying the pancreatic ducts would yield results in diabetes.

The effect of ligating the ducts is to cause degeneration of the cells which secrete the digestive enzymes, whereas those of the islets, which apparently secrete the anti-diabetic internal secretion, remain more or less intact.

It was observed that the effects produced by injection of these extracts on the percentage of sugar in the blood, as well as on the total sugar excretion in the 24-hour urine of dogs, rendered diabetic by extirpation of the pancreas, was to cause a definite lowering of both of these values.

The observations were frequently repeated with all necessary controls, and it was further noted that the exhibition of the extract also greatly improved the subjective condition of the animal and markedly prolonged its life.

Later an active extract was prepared from the pancreas of a full-grown ox by using alcohol as the extracting medium, and it was administered to a diabetic boy of 14 years. The result was to reduce the percentage of blood sugar by about 25 per cent.

This may be considered to mark the close of the first and fundamental step in the discovery of insulin, the name which, following Sir E. A. Schafer's suggestion, has been given to the internal secretion of the pancreas.

Professor Macleod goes on to say that as to the mechanism of the action of insulin we are as yet in the dark. One fact of great importance is that it increases the rate of sugar consumption by the isolated mammalian—rabbit—heart, but it was not possible to determine whether the more rapid disappearance of sugar under insulin was due to its increased combustion or to its being deposited as glycogen in the heart.

This observation on the heart would seem to narrow down the locus of action of insulin to the muscular tissue.

Insulin in Diabetes Mellitus.

The effects of insulin in removing the cardinal symptoms of diabetes in depancreatised dogs, as well as those observed on normal rabbits, have been found also to follow its administration in the disease, diabetes mellitus, in man, and every detail of the therapeutic effects of this hormone was definitely forecasted by animal experimentation.

Since March last a sufficient number of cases of all degrees of the disease have now been observed to justify the statement that when insulin is administered subcutaneously in adequate dosage it is capable, within a remarkably short time, of removing the cardinal symptoms of the disease for a period of several hours.

To suppress the symptoms permanently, however, the injections must be repeated, the practice at present being twice daily. So long as the administration is maintained the patient is able to assimilate much more carbohydrate than previously, and he gains weight, and with it both physical and mental vigour, so that the despondency and apathy that are so prominent in these cases disappear. Whether the diabetic condition is in any degree cured by the rest which is given to the damaged pancreatic function by insulin cannot as yet be stated.

The Thyroid.

A description of the anatomy, histology and physiology of this gland would, with the pathology and symptomatology, occupy a large amount of time, so I shall only touch on certain points.

The most striking feature of a thyroid gland from a chemical standpoint is the constant presence in it, under normal conditions, of measurable amounts of iodine. The following elements have been stated to be present in the thyroid:—Carbon, hydrogen, oxygen, nitrogen, sulphur, calcium, phosphorus, sodium, potassium, magnesium, silicon, fluorine, arsenic, chlorine, bromine, and iodine.

The percentage of iodine varies from 0·01 to 1·16 for dried glands. Other mammalian tissues do not contain more than 0·001 per cent.

The relative amount of thyroid tissue seems to increase as we ascend the scale of evolution, but the iodine content does not increase in a corresponding degree.

In cattle both thyroid tissue and iodine content are greater in the female than in the male.

In regard to age, the maximum iodine content in the human subject is found between 40-60 years. The lowest figures are obtained from subjects under 15 years of age.

It would appear that there is a seasonal variation in the iodine content of sheep, pig and ox thyroids. Cannon finds during March and April a difference experimentally in response. Thus the percentage between June and November is usually from two to three times as great as that between December and May. These variations are probably due to metabolic changes due to temperature. It is possible that these seasonal variations may be reflected in the incidence of disease processes.

However, variations in content largely depend on diet. The thyroids of herbivora have more iodine than those of carnivora. Sheep fed largely on seaweed show a large amount of iodine in the thyroid.

In an ordinary human diet the thyroid iodine is obtained from fish, molluscs, milk, eggs, wine, etc.

Feeding tadpoles with thyroid substance will cause precocious differentiation, while growth is suppressed. The tadpoles begin to undergo metamorphosis a few days after the application of the thyroid and long before the control animals do so.

Tissues grown *in vitro* increase several times as rapidly in the presence of thyroid substance as in its absence.

Small doses of dessicated thyroid gland adminstered to young white rats produce,

(*a*) a definite and invariable decrease in the rate of growth.

(*b*) hypertrophy of the organs concerned with increased metabolism—heart, liver, kidneys, adrenals, etc.

(*c*) disappearance of fat.

The decrease in rate of growth is proportional to

(*a*) the amount of thyroid given ;

(*b*) the iodine content of the gland given.

Many attempts have been made to induce symptoms of exophthalmic goitre by means of the administration of thyroid substance to animals.

It is doubtful whether a condition strongly resembling exophthalmic goitre has ever been brought about by such methods. There can be little doubt that definite toxic effects can be produced by thyroid feeding—loss of weight, gastro-enteritis and diarrhœa, rather than tachycardia, nervousness and exophthalmos.

I had the good fortune several years ago to come across a litter of pure-bred bull terrier puppies all affected with goitres. The father and mother were unaffected nor could the condition be traced in their pedigree. Normal when born, they had been kept in an outhouse on the floor of which were large quantities of lime and the suggestion was made that the puppies swallowed more lime than was good for them and so developed the goitres. Following the idea that goitre in humans occurs in limestone districts, the assumption that lime swallowing was the cause of the trouble was quite reasonable.

Note, I say "lime swallowing." At first glance it would be assumed that excessive lime swallowing and consequent excessive lime absorption into the blood stream were synonymous terms—with the result that one would assume that the large amount of lime swallowed was the direct cause of the goitres. That need not necessarily be the case. It might quite reasonably be supposed that the large amount of lime swallowed caused a chemical combination with some essential foodstuff in the alimentary canal and prevented that being absorbed, thus leading indirectly to goitre production or that the large amount of lime neutralised the gastric juice acid and so permitted increased bacterial multiplication. In a young growing animal lime is a necessity, it exists in the mother's milk in large quantities, but the form in which it is presented for digestion is not that of slaked lime or quick lime.

I acquired this litter and watched them. *Post-mortems* were made and each puppy showed enlargement of the thyroid lobes, with or without accessory thyroids. One showed a thyroidal nodule at the base of the tongue below the hyoid bone, another small accessory bodies lying along the vago-sympathetic sheath, whilst in one case a small nodule of thyroid tissue about the size of a pea was found lying between the pulmonary artery and the aorta, and presenting a free surface inside the pericardium—covered apparently only by the endothelium of the pericardium. I showed this specimen to Sir George D. Thane, Professor of Anatomy at University College, who very kindly took the trouble to look up the literature and found that a similar condition had been described by Woelfling as occurring very occasionally in the dog, but apparently in no other animal. It was thought that the apparently aberrant location of this piece of thyroidal tissue could be explained by the development of the pulmonary artery from the gill arches drawing down cells capable of developing into thyroidal tissue.

One puppy during life exhibited most of the symptoms of exophthalmic goitre. Exophthalmos was, however, not so marked—naturally from anatomical reasons—as in man, but otherwise the animal showed tachycardia (quite uncountable), restlessness, wasting, tremors—symptoms well summed up by the phrase "continuous fear" manifestations.

At *post-mortem* this puppy showed both thyroidal lobes enlarged, but in a curious way. At the top of each lobe was a hook-like piece continuous with the main mass, which was pear-shaped. The hook-like piece was normal thyroid, the pear-shaped mass showed the histological characteristics of exophthalmic goitre ; large vesicles containing mucinous

colloid, the epithelium, several layers thick, composed of large columnar cells. The transition between the normal thyroid and the abnormal was fairly abrupt. The specimens were shown at a laboratory meeting of the Pathological section of the Royal Society of Medicine and were examined by Sir Victor Horsley, who pronounced the exophthalmic specimen to be typical exophthalmic tissue.

Possibly members have met similar cases and would describe them. There is reason to believe that the proper growth and development of the sexual organs depends on the functional integrity of the thyroid gland.

The ovaries are believed to exert an inhibitory action on the thyroid gland, so that the latter becomes over-active after castration. This hyper-activity is revealed by an increase in the amount of colloid matter.

Most of the activities attributable to the active principle or principles are in the direction of metabolism, though, according to some authorities, there are indications of the existence of an anabolic principle.

The secretion is probably under the control of the sympathetic. The thyroid is not equally important in all groups of animals. Adult herbivora can live in good health without a thyroid, while the carnivora under such conditions will frequently suffer severely and die. It would be interesting to have observations on the incidence of myx-œdema in these groups. Feeding rats with goitrous substance always causes an increased sensitiveness to lack of oxygen. This was also found, although the reaction was less strong, when serum was injected from the thyroid veins.

In lambs and guinea-pigs the total amount of glycogen in the liver is diminished after thyroidectomy, as is the percentage amount in the muscles.

Further dietetic experiments on rats show that feeding thyroid gland increases the proportion of fat metabolised, while removal of the thyroid gland diminishes the combustion of fat.

As bearing on the subject of oxidation processes, the following experimental work is of interest.

Widal and Abrami found that, when dogs were exposed to cold by immersion in water from 2°-5° C. for varying periods and according to the length of immersion, they suffered from manifestations of shock in varying degree.

Short periods produced changes in the blood consisting of :—

(1) Diminution in the number of white corpuscles, in 45 minutes from 12,000 to 5,000.

(2) A relative increase of lymphocytes and decrease of polymorphonuclear cells.

(3) Large decrease in the clotting time of the blood.

(4) Diminution of the refractive index of the serum.

Further symptoms were pyrexia, dyspnœa, nausea, œdema, urticaria and finally *haemoglobinuria*.

These symptoms are identical with those following intravenous injection of foreign protein into dogs and with those of anaphylactic shock in the dog.

These forms of shock would appear to be identical. As to how far these results may be attributed to fear processes pure and simple due to the abnormal environment, and how far due to cold *per se* is an interesting question, the point being whether other states producing fear processes for a similar length of time might not produce the same or similar results.

The symptom of hæmoglobinuria is interesting in connection with equine hæmoglobinuria, for my remembrance of the incidence of those cases I have seen is that they occurred on a cold day. As illustrating the reactions to environmental stress of subjects deficient in thyroid tissue, the following work by G. Cori is interesting.

The heat-regulating mechanism of a myxœdematous child of four years of age was compared with that of normal children of a like age.

(*a*) On placing in a cold bath the temperature of the myxœdematous child fell as much as 3° C. in the course of two and a half hours.

The temperature of a normal child was maintained, although both types of children showed external evidences of the cold bath.

(*b*) In a warm bath the myxœdematous child did not perspire and the skin remained white, and it behaved as if narcotised.

While the temperature of the normal children rose, the temperature of the myxœdematous subject was unaffected by external heat.

(*c*) On injection of foreign protein (3 c. c. of cow's milk) there was a rise of temperature of over 2° C.

(*d*) Pilocarpine and atropine exercise a more pronounced effect than with normal children.

(*e*) The myxœdematous child did not react to adrenalin with a glycosuria.

The child was treated with thyroid, with evidently excellent effect and the experiments repeated.

In all cases, the metabolism approached that of normal children.

The Parathyroids.

These are small glandules attached to the thyroid and are histologically and physiologically separate glands, although very minute.

They were discovered by Sandstrom in 1880, and again by Gley in 1891.

Vassale and Generali removed all four parathyroids from nineteen animals—ten cats and nine dogs—leaving the thyroids intact.

Of the ten cats, nine succumbed within ten days, most of them at about the fifth day after the operation, after presenting a typical strain of symptoms.

There were fibrillary twitchings, muscular spasms, psychical depression, stiff and tottering gait, loss of appetite, tachycardia, rapid emaciation and lowering of body temperature.

The nine dogs all died within eight days, mostly on the third or fourth day after the operation.

They were, as a rule, in good health the day after the operation, but began to show symptoms on the second or third day, and then rapidly died, after manifesting a variety of morbid symptoms. These were psychical depression, muscular tremors, paresis

of the muscles of mastication, trismus, rigidity of the hind limbs, uncertain gait, general muscular feebleness, and convulsions. There were also anorexia and vomiting, palpitation and dyspnœa. The urine was scanty and sometimes contained traces of albumin. It has also been shown that there is a marked increase in the irritability of the sympathetic nervous system. These symptoms in dogs are very suggestive of choreic manifestation in the dog, and it may be possible that some of the symptoms of that disease may be due to poisoning of the parathyroids by the infection of distemper.

Many theories have been brought forward to explain why removal of the parathyroids should give rise to the above symptoms. The two principle views are :—

(1) Calcium deficiency.

(2) Some toxic agent.

Sabbatini and others have shown that soluble calcium salts diminish the excitability of nervous tissues, and MacCallum has shown that an injection of soluble calcium salts into the circulation of an animal in tetany following parathyroidectomy, promptly checks the symptoms.

The hyper-excitability of the nerves which is characteristic of tetany is due to some change in the blood. It has been shown by cross circulation experiments that, if the leg of a normal animal is supplied with tetanic blood, this condition of hyper-excitability soon manifests itself in the nerves of the normal leg.

In 1912, W. F. Koch demonstrated a toxic agent—methyl guanidine is constantly present in considerable amount in the urine of parathyroidectomised dogs.

In conditions of tetany, therefore, the tendency has been to regard the condition as rather due to the poisoning than the diminished amount of calcium in the blood, although the necessity for the latter in treatment could not well be denied.

Now tetany occurs in rickets—a disease associated with calcium metabolism.

This year G. Bayer has published some work showing that poisoning with guanidine results in a speedy lessening of the amount of calcium in the serum, but that the reduction is not so great as occurs after removal of the parathyroids.

He suggests that the poison acts upon the parathyroids and overstrains them in their attempt to convert it into creatinin. It will be seen that there can be grouped around the thyroid and the parathyroids, diseases and abnormal states, which are exceedingly interesting to the biochemist, occurring in both animals and man.

Ennis Smith describes thyroid disturbance prevalent among new-born animals in North America. It affects pigs, sheep, cattle, horses, goats and dogs.

The condition is endemic and appears to correspond to the distribution of goitre. The most striking feature in typical cases is the absence of hair. The hoofs are thin-walled, short, brittle and clearly under-developed.

There is hyperplasia of the thyroid, with low iodine content. The pathogenises is possibly dependent on lack of available iodine, and it is stated that the malady can be overcome by providing abundance of this element in the diet.

The Reproductive Glands.

Apart from the ordinary reproductive tissue of these organs, there exists in them a special tissue to which the name "interstitial gland" has been given. This tissue is made up of cells having a typically glandular appearance. They have abundant blood supply and contain granules. These granules are of various kinds, as indicated by their staining reactions. It is assumed that these interstitial cells preside over the nutrition of the reproductive organs (*e.g.*, the uterus), and are responsible for the appearance of the secondary sexual characters.

Osteomalacia—this disease has been connected with over-activity of the ovaries, based upon the fact that the condition is benefited both by removal of the ovaries—often found to be cystic—and by artificially-induced labour.

In this connection, the observations of members on the emotional disturbances associated with diseased ovaries and testes would be interesting.

It has been shown by Sir F. W. Mott that prior to birth the interstitial cells, which predominate in the interstitial tissue, making up the greater part of the testes, act as sexual determinants.

After birth they undergo a regressive atrophy and disappear. At puberty and adolescence, when the seminiferous tubules have greatly increased in size, abundant mature interstitial cells are present. They continue to mature and to decay, and to be replaced by others during life.

In certain emotional disorders in man Sir Frederick Mott has shown that both seminiferous tubules and interstitial cells undergo retrogressive atrophy.

As showing the effect of lesions of the central nervous system on the testes, the following work by Camus and Roussy may be quoted.

A dog in which an experimental lesion at the base of the brain was produced at the end of 1919, became enormously fat, while there were signs of testicular insufficiency. Its weight increased from 15 to 26 kilograms and it suffered from diabetes insipidus, passing 3-4 litres of urine in twenty-four hours.

The Adrenals.

An enormous amount of work has been done on these organs. Each adrenal is made up of a central portion termed the medulla and an outer portion—the cortex. That adrenalin is extracted from the medulla is common knowledge.

The general effect in dogs of a subcutaneous injection of adrenal extract is to cause excitement. There is increased muscular activity, which passes into a stage of agitation with tremors until paresis, and finally, paralysis comes on. Thirst is also a striking symptom in dogs. There is abundant micturition, but no hæmaturia.

In cats the most noticeable result is an enormously increased rapidity of the respiratory movements in the early stage. Thirst and loss of appetite were recorded, but the paralysis was not so definite as in other animals. The paralysis is due to the action of the poison on the central nervous system as well as on peripheral nerves such as the vagus.

The extract excites the salivary and lachrymal glands, the liver, the muscular tissue of the uterus and vagina, of the vas deferens, the vesicular seminales, the dartos, and the muscular coat of the stomach. In the stomach inhibition of muscular movements is produced. Broadly, the effects produced are almost all such as are produced by stimulation by some one or other sympathetic nerve.

It is now generally accepted that the function of the adrenal medulla is to secrete adrenalin or adrenin and that this mechanism of secretion is under the control of the sympathetic system, and is normally brought into action by environmental stresses causing anger, fear and rage to which the animal responds thereto by flight or fight. The adrenalin acts as a chemical stimulant to the sympathetic system causing vaso constriction of the skin and alimentary canal vessels and dilatation of the vessels to the muscles, which are provided with more food material to burn up by the action of adrenalin on the liver causing a liberation of glycogen into the blood stream.

Some authorities have suggested that the adrenal medulla and the thyroid control the heat-regulating mechanism.

The adrenal cortex. There are four views as to the function of the adrenal cortex :—

(1) It is related to growth and development, especially of the sexual organs.

(2) That it has an anti-toxic function.

(3) That it plays some part in the elaboration of the adrenalin found in the medulla.

(4) The enormous development of the adrenal cortex in the human embryo is connected with the highly developed brain of man.

It is tolerably certain that there is an intimate connection between sex characters and the adrenal cortex.

Tumours or hypertrophies of the adrenal body are sometimes associated with precocious development of the reproductive organs.

Hyperplasia of the adrenal gland or of accessory adrenals is frequently associated with pseudo hermaphroditism. As to the antitoxic view, the following points are interesting.

Cobra poison, after being mixed with an emulsion of the adrenal cortex, was no longer toxic, control experiments with emulsions of the medulla and of other organs giving negative results.

Experimental infections with various organisms, such as the tubercle bacillus, and with toxins, such as the diphtheria toxin, give rise to hypertrophy of the cortex, and in some instances apparently to deficiency of the medulla.

The Pituitary.

It has been found by Cushing that puppies survive total extirpation longer than do adults, and life can be prolonged by transplantation of the removed gland, that in all cases which recovered a fragment of the anterior lobe was invariably found to have survived, that animals with a fragment of anterior lobe temporarily insufficient to support life could be tided over a period of threatened cachexia by subcutaneous injections or by feeding with anterior lobe, and that removal of the posterior lobe leads to no very definite symptoms.

The acute symptoms observed were tremors, fibrillary twitching, arching of the back, insensitiveness, slow pulse and respiration, a terminal abrupt fall in body temperature and apathy passing into coma and death.

Mr. President and Gentlemen, you have patiently listened to a discourse which is extremely patchy, and has, I fear, little continuity.

A few points I have made here and there come within the possibility of clinical interest and practice—such as the emotional disturbances associated with diseased ovaries and testes ; the question of tetany and rickets ; the associated symptoms of equine hæmoglobinuria ; the incidence of myxœdema, and goitre in animals, especially dogs ; tumours met with in association with these ductless glands and the symptoms shown.

I trust from this very broad survey an interesting discussion will arise.

I have to acknowledge the assistance I have obtained from *Internal Secretions and the Ductless Glands*, by Professor Swale Vincent, and reviews of papers published in *Medical Science.*

Dr. J. Stanley White, M.R.C.S. (Eng.), L.R.C.P. (Lond.), Ph.C., of the scientific staff of Parke, Davis and Co., then gave a lecture on " Veterinary Biological Products," illustrated by lantern slides.

(Dr. White's paper, which was also presented at a meeting of the Central Veterinary Society early last year, was fully reported in the *Veterinary Record* of April 15th, 1922.—Ed.)

Discussion.

Mr. Tudor Hughes, who at the request of the Chair, opened the discussion, said that the occasion marked a red letter day in the history of the Association, and they were deeply indebted to Dr. Graves and Dr. White for their masterly treatment of the subject of the ductless glands and the biological therapeutic products. The two addresses, from their different points of view, had been wonderfully lucid and full of most valuable information. It was a very wide subject to be called upon to discuss at a moment's notice, but there were one or two points he would like to mention. Dr. Graves suggested that there might be, under the head of the thyroid gland, some connection between the temperature, in the way of extreme cold, and hæmoglobinuria. When he was on service in Canada and U.S.A., he came across it during the cold weather, particularly in those animals

which had been housed. In discussing the problem with a local practitioner he found that they had more fear of severe cases of hæmoglobinuria in the cold weather among cases that had been housed than amongst the general stock that were ruuning out and not over-fed. It was looked upon as a disease of winter, when the temperature was low. One theory with regard to its etiology which gained a certain amount of credence was that it was due to a thickening of the blood and connected with the calcium factor, and the treatment comprised the administration of oxalic and citric acids. Very interesting were the slides Dr. Graves produced showing the effect upon the reproductive organs, and it really looked as though Nature, in her far-sighted manner, was making an endeavour to eliminate the unfit by making the reproductive organs useless. One point that struck him in regard to the ductless glands was the way in which they seemed to be connected with the sympathetic nervous system. He thought it would be distinctly to their advantage if they could have a few words from Dr. Graves with regard to the therapeutics of the sympathetic system. With regard to Dr. White's paper, which was extremely interesting. he would like to know what was the comparative period of protection afforded by black-legoid, aggressin and filtrate. Was filtrate likely to provide the longest period of protection, and ultimately supersede the other methods of vaccination ?

Mr. H. W. Dawes said he would like to thank the essayists for two very interesting addresses. He thought they could point with pride to their agenda of that day as a marked advance on the old order of things. Veterinary practitioners were taking an interest in medical science that took them beyond their everyday work and they could not fail to improve their general knowledge in the process. After listening to Dr. Graves, he could not help thinking that the veterinary profession was on the verge of a new era in therapeutic measures. There was no doubt that the relation of the ductless glands to certain diseases in the higher animals was only partially understood.

With regard to the parathyroid glands, apparently it was recognised that they performed a double function, firstly, of regulating calcium metabolism, and secondly, of exerting a destructive effect upon toxins which had a predilection for the nervous tissues. This latter function was particularly of interest with regard to chorea in the dog. He was of the opinion that no case of chorea arose except as a sequel to a distemper infection, which latter, however, might be so slight as to escape clinical observation. If chorea was, then, a manifestation of a nervous toxæmia, it was possible that by increasing the work capacity of the parathyroids by administering extracts of these glands, some very useful therapeutic measures might be adopted. The symptoms produced by parathyroidectomy in the dog showed close resemblance to the symptoms exhibited in chorea.

Another ductless gland of interest was the thymus. Its large size in the young animal and its consequent disappearance during early life must exert influence over the metabolism of the body. The relation between persistence of the thymus and the pathological condition known as *status lymphaticus* was of great interest. He observed that Dr. Graves had not touched upon the possible internal secretion of the *prostate gland*; it seemed that it possessed, in addition to its usual function, an internal secretion. In cases of enlarged prostate in the dog, with accompanying symptoms, relief was often obtained by castration, improvement commencing very rapidly after operation, and it would be of interest to investigate the possible relation of the prostate and testis as regarded their internal secretions.

Mr. James Blakeway bore testimony to the useful character of the addresses, which he was very glad not to have missed. He only regretted that he was unable to throw any new light on the subject, but he had learnt a good deal that afternoon, as he was sure they all had.

Mr. Aston said Dr. Graves had interested him more than a little, for he had been groping in the dark for some time in regard to certain reproductory disorders. One case in particular came to his mind as having a bearing on the question of ductless glands. It was that of a mare turned out in use. She was found a little later showing severe nervous symptoms, although her general health was normal. He had her under observation for a fortnight without any improvement and he then examined her ovaries. The left one was normal, but the right one was enlarged and sore. The mare yielded to treatment. Some time ago, he had a case of chronic dysentery which he thought was due to some organism. On examination he found the *bacillus coli communis* and was told it was normally present. He could not see what good a vaccine made from that was likely to be.

Mr. Livesey said he must first thank the President and Hon. Secretary of the Association for sending him an invitation to be present on that most interesting occasion. It had been a great pleasure to listen to the very able and very lucid papers by Dr. Graves and Dr. White. He was specially interested in what Dr. Graves had to say about the secretion of the thyroid gland and goitre, but he did not mention the use of thyroidectin. It was not seen often in dogs, but he had tried it in two cases of what he believed to have been exophthalmic goitre in dogs. It produced a marked diminution in the nervous symptoms and a reduction in the size of the glands. If his hearers had not tried it, it was worth a trial, for it was a useful drug. He was also interested in the subject of the parathyroid in relation to distemper in dogs. One never saw a case of chorea in the dog that was not the direct sequel to distemper infection. This was not the first time he had heard Dr. White lecture, and he could assure them that when he appeared a short time ago before the Central Veterinary Association, he was received with the

greatest possible enthusiasm. Dr. White was an accomplished speaker, as they had heard for themselves, and had lectured in all parts of this country and the United States. He was glad Dr. White had had an opportunity of meeting veterinary surgeons and satisfying himself that they were a scientific body anxious to learn anything new that would assist them in the practice of their profession.

Mr. CORMACK said it was some years since he studied the ductless glands and he would like to sit down and ponder over the two admirable papers they had just listened to before discussing them. He had found the papers most interesting and, no doubt, each of them would like to keep the subject in his mind until they found some means of explaining conditions which, at the present time, they were at a loss to understand. One point occurred to him while Dr. Graves was lecturing and that was whether there was any connection between the thyroid and the parathyroid glands. Were the parathyroids considered satellites of the thyroid, or absolutely independent? A few years ago some experiments were carried out on monkeys, the thyroid glands being removed in an endeavour to find out whether the parathyroid glands would take up their functions. The parathyroid glands had a tendency to increase in size, which rather suggested that they were to some extent endeavouring to do the work of the thyroid. He was interested in the question of the causal agent of distemper in dogs. It occurred to him to ask whether the *bacillus bronchisepticus* was capable of producing different forms of distemper, or whether it was not more usual to find it setting up the respiratory form (affecting the nasal organs and the lungs), or whether it would give symptoms of what was considered the intestinal form or the nervous form of distemper? His own idea was that it was some other organism which, under the auspices of the *bacillus bronchisepticus*, played its part in the intestinal form of distemper.

Mr. BROOKE said the Association was under a great debt of gratitude to the two essayists, who had left them all in a state of mental intoxication. So many interesting facts had been introduced into the two papers that one's scientific mental basis was disturbed for a time. He was not clear on the subject of *dementia praecox* in the human being, but the matter of sterility in the male from this point of view deserved consideration. They had to rely on certain drugs to overcome genital incompetence and it seemed to him that they had something better in the products of the ductless glands. With reference to adrenalin, he could speak personally of its great value. With regard to the parathyroid, he believed it to be antagonistic to the thyroid, and if a study of this question would lead to a treatment that would protect the nerve cells from distemper poisoning, they would be on the track of something good. Different practitioners had different treatment both for distemper and chorea, and if the development of the parathyroid extract gave anything like the result that was promised it would be doing a good service to the veterinary profession.

The HON. SECRETARY said he desired to express his personal thanks to the two essayists for giving them one of the best intellectual entertainments they had ever had at a Midland meeting. He had known Dr. Graves as long as most people and anything he had to tell them was well thought out. The subject of ductless glands was to him (the speaker) very fascinating and very interesting, and it seemed as if they were on the threshold of great and important discoveries in relation to them. He did not know whether they had seen a book just published by Dr. Harrower entitled Organo-therapy. It was interesting to read in that book the number of diseases that were estimated to be caused in connection with the ductless glands. A number of experiments were recorded, one in particular was very interesting from a veterinary surgeon's point of view, viz., experiments in the use of the placenta. Some of the experiments in this book had to do with the question of milk. Cases were recorded in which at birth there had been a deficient secretion of milk, but by the administration of dessicated placenta and mammary extract there had been milk in abundance. How often did the veterinary practitioner come across similar cases in animals in which it was highly desirable to increase the milk supply? They had no conception until they studied the matter closely, of the number of diseases that were caused or accentuated by disturbance of the ductless glands. Listening to the papers, it occurred to him whether milk fever was due to any disturbance of the ductless glands. It was a very mysterious disease, and although they had a successful and easy method of treating it, they had never found out the cause of it. With regard to Dr. White's address, they must all agree that it had been an intellectual treat. He was glad to see such a good attendance, which was a compliment which the two distinguished visitors richly deserved. They would all go away with something to reflect upon, and they had learned something which could scarcely fail to benefit them as veterinary surgeons.

THE REPLIES.

Dr. GRAVES, replying to the discussion, thanked the meeting for their kind reception of him and his modest effort to place before them a subject of undoubted professional interest in the pathological study of man and animals.

He did not pose as an expert on the subject of the ductless glands, but his work led him to take a deep interest in the subject of biochemistry. We reacted on chemical lines to environment, and death was the chemical result of the final battle between the living organism and its environment. Omar Khayyam spoke of the "predestined plot of dust and soul." If that little plot of dust was defective in any way, if the ductless glands were not normally developed and balanced, as say, in cretinism, the battle with environment could not be effectively fought.

Therefore disease processes, which were the reaction to environment, had to be studied from all points of view, and biochemistry, which included within its scope the chemistry of the ductless glands, was the method which would give the best results.

The old pathology dealt with diseases of individual organs—the heart, the lungs, the liver, etc.—but it was now recognised that a disease process—a reaction to environment—was not an isolated entity affecting one organ alone; there was a reaction of the whole body. Let them take, as an example, pneumonia; formerly it was regarded as inflammation of the lungs, but they knew now that the whole body responded to the infection, which had its obvious battle ground in the lungs. All the tissues had to give something to fight the invader, whether in the lungs or elsewhere, and the ductless glands were important factors for the supply of the munitions.

Under certain conditions of acute infection they got delirium, or toxic poisoning.

However, they also met a delirious state where there was no obvious invader apparent, such as in milk fever, a condition unique in human and veterinary practice in that whilst they knew exactly how to treat it with success, they knew nothing of the pathology, and the simplicity of the method of treatment was such as to act as a constant block to any speculative line of thought concerning the pathology of the disease.

Disease was not confined to any one group of animals and information derived from one group was of value in the study of disease occurring in another.

He was interested in Mr. Hughes' remarks concerning hæmoglobinuria occurring in housed animals when exposed to severe cold in Canada. As to whether the condition was due to thickening of the blood or excess of calcium salts could not be deduced, but what was required was investigation of the blood before and after the onset of an attack.

As to the therapeutics of the sympathetic system, the subject was too immense for discussion at that late hour. It might be supposed that the parathyroids and the thyroid worked antagonistically, in that the former were apparently more concerned with calcium metabolism and the thyroid with iodine metabolism. The one element was a base, electro-positive, and the other acidic and electro-negative.

In a similar way it was known that certain substances were stimulant to the true sympathetic system—such as adrenalin; others were depressant to that system. Some, apparently, were stimulant to the para-sympathetic—such as choline, and probaoly others were depressant. The latter system was regarded as anabolic; the true sympathetic was katabolic and was a system called into full play to enable the animal to operate mechanisms for its defence either by flight or fight.

A further study of bio-chemistry and bio-physics led one to the question of the permeability of cells to certain substances. These studies took one down to the ultimate bed rock of the chemical basis of life—colloidal chemistry.

He must refer those desiring information on the subject of the ductless glands to the various books that had recently appeared, such as that by Professor Swale Vincent.

Some books had been written in which it would seem that the whole of the problems of personality were concerned with the ductless glands and that all disease processes could be cured by ductless gland therapy, but it was well to be cautious and to demand proof before accepting the conclusions that were suggested. In reply to Mr. Dawes, jun., it was suggested that there might be a relationship between the parathyroids and the nervous symptoms of the chorea of distemper. In this disease of distemper they had young animals developing septic infection and, whatever the organism might be, a general draining of the system as a result.

The symptoms of parathyroidectomy resembled those of chorea and it might be worth while trying the effect of the parathyroid extract to see whether it might ameliorate the symptoms. As regards prostatic disease in aged dogs, it had been suggested in human medicine that chronic prostatic disease was due to chronic septic infections, such as pyorrhœa and other dental infection. If that were so, the obvious remedy was to remove diseased teeth. He was sorry Mr. Blakeway could not be drawn into the discussion, because he might have told them something interesting of the character of the vice displayed by animals with diseased gonads and the seasonal variation of such vice.

With regard to the relation of the placenta to milk formation, it had been noted that milk secretion could occur in virgin animals, but that did not negative the possibility of the inter-relationship of the placenta and milk secretion.

He repeated his thanks to those present for the manner in which they had listened to and discussed the paper.

Dr. J. Stanley White said there was just one thing which was a little unfortunate, and that was that he had not confined his remarks entirely to the ductless glands. He was in this position at the moment, that instead of being questioned himself he would liked to have the opportunity of asking a few questions of Dr. Graves, because the subject of ductless glands interested him quite as much as vaccine and serum therapy. Most of the ground in the discussion had been covered by Dr. Graves in his reply, and there was really very little for him to add. With regard to the use of thyroidectin in the case of goitre in dogs, he would like to point out that there was more than one condition of goitre. Thyroidectin was prepared from the blood of horses which had been partially thyroidectomised, the idea being that such an animal would develop some antibodies which would neutralise the circulating toxin believed to be present in patients suffering from exophthalmic goitre. If any veterinary surgeon had a case of exophthalmic goitre in dogs, he might do worse than try three grains of quinine hydrobromide three times a day. It had proved very successful in many cases.

With regard to vitamines, they were derived from the vegetable kingdom and they knew of the existence of at least three: the Fat-Soluble A, Water-Soluble B, and Water-Soluble C. Vitamines were of very marked value in the treatment of rickets and allied conditions in young animals. Some years ago the people at the Zoo were unable to rear their bear cubs, and Sir John Bland Sutton, whom they consulted, suggested feeding them on cod liver oil, a substance very rich in Fat-Soluble A, although at that time the vitamines were not known. The result was most satisfactory. He did not say rickets was due entirely to an absence of Fat-Soluble A, but though other factors might be at work, notably fresh air, such absence played a very important part in the condition. With regard to black-leg or symptomatic anthrax, the point about the use of aggressin was that it should be injected several weeks before the black-leg season came round. The immunity appeared to last just as long as that following the use of Black-legoids, and had the advantage that it contained no organisms even in an attenuated form. As for the *bacillus bronchisepticus*, he suggested that it might make an interesting subject of a short paper for the *Veterinary Record*. He had already handed to Mr. Livesey some data which had come into his possession from Dr. Ferry, who first isolated the organism, and who was one of the most conscientious workers he had ever met. He was very interested in the use of ductless glands products in the treatment of sterility, but as a paper on the subject was to be read in the near future before the Royal Society of Medicine, he would not anticipate what that paper might contain, beyond saying that some of the experiments were extraordinarily promising.

Votes of Thanks.

The President moved a vote of thanks to Dr. Graves and Dr. White for their most interesting addresses. That had not only been the largest, but also the longest meeting of the Midland Association since he had belonged to it, and he was only sorry that time would not enable them to go still further into the subject.

The Hon. Secretary, in seconding, said they had made a new departure in inviting two distinguished medical men to address them on such a subject as ductless glands. From the large attendance and the extraordinary attention which had been paid to the papers, he was sure it was a departure which everyone appreciated.

The vote of thanks was heartily carried and acknowledged.

The company, as usual, had tea together.

H. J. Dawes, F.R.C.V.S., *Hon. Sec.*

Pigs are the first class of live stock to show a revival in the export trade. During the last ten days one Scottish herd has had inquiries for over 160 head of pedigree pigs from three different overseas countries.

Notes and News.

The Editor will be glad to receive items of professional interest in these columns

"Dick" College Debate.

The Dialectic Society of the Royal (Dick) Veterinary College held an inter-debate with the Agricultural College, on Friday, January 26th. Dr. O. C. Bradley occupied the chair, and a large number of students was present. The subject of debate was:—"That the Science of Genetics is not applicable to Practical Stockbreeding." Messrs. Howie and Miller supported the motion, which was opposed by Dr. Crewe and Miss Williamson. Some very interesting papers were given, and a discussion followed, resulting in the motion being easily defeated.

"Jubilee" of Prof. Perroncito.

The Belgian Government has awarded the "Croix de Commandeur de l'Ordre de Leopold" to Professor E. Perroncito, of the Veterinary School at Turin, on the occasion of the celebration of his fiftieth year as Professor.

Second International Congress of Comparative Pathology.

This Congress, which was unavoidably postponed from September, 1922, will now take place in Rome, from the 7th to the 14th October next. The Congress will include members from the medical and veterinary professions, and already 70 papers have been promised. Subscriptions (40 lire) should be sent to Professor E. Perroncito, President of the Congress, 40 Corso Valentino, Turin.

Appointment.

Mr. John Rice, M.R.C.V.S., B.Sc., F.Z.S., has been appointed Veterinary Inspector for Montrose, Ireland.

An interesting function, which is regarded as the official send-off to the Rowett Institute of Research in Animal Nutrition at Bankhead, Aberdeen, was held on Thursday, January 18th, when a company numbering about 200, representative of various agricultural, educational, and scientific bodies, and of prominent public men and leading farmers and stock breeders throughout the north, assembled at a reception held in the library of the Institute.

Erratum.

We regret that, on page 111 of the *Record*, the obituary notice with regard to Mr. James Pollock, Hamilton, contains an error. Mr. James Pollock was an existing practitioner, and not a member of the R.C.V.S. The heading of the paragraph, as it appeared in an agricultural paper from which the notice was taken, led to this misunderstanding, as Mr. James W. Pollock, of Lockerbie, is a M.R.C.V.S.

Correspondence.

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.
All correspondence must bear the name and address of the contributor for publication.
The Editor does not hold himself responsible for the opinions of his correspondents.

Anæsthesia in Menagerie Patients.

To the Editor of the "Veterinary Record."

Sir,—In the report of the discussion on the above subject, on page 100 of last week's issue, I am stated to have said, when referring to chloral hydrate, that "It is most necessary when given hypodermically that every drop must get into the veins."

It is obvious that the word "hypodermically" should have read "intravenously," and I should be glad if you would kindly make the correction in your next issue.—Yours faithfully, G. H. Wooldridge.

Royal Veterinary College, Camden Town.
February 12th, 1923.

The Tuberculin Test.

To the Editor of the "Veterinary Record."

Sir,—I confess I was somewhat startled on reading the letter in the last issue of the *Veterinary Record* from Mr. J. Forbes, stating that, in his view, the taking of the temperature of animals submitted to the subcutaneous tuberculin test at the 6th and 9th hours is a waste of time, and that if a tuberculous animal has a temperature at the 6th hour, it will have it at the 12th and a good many hours after.

It would, in my opinion, be very unfortunate if that view were to be generally adopted, because it would undoubtedly lead to a very wide margin of error in the interpretation of the tuberculin test. There are numerous instances in which animals submitted to the tuberculin test react quite early, and a rise of temperature may be frequently noted before the 6th hour, and may have reached its maximum and be partially abated before the 12th hour.

If the temperature in these cases is first taken at the 12th hour, when it is on the decline, a positive reaction may be missed, and the temperature registered may, therefore, give rise to a faulty interpretation.

In view of the opposition that already exists, on the part of certain farmers and others, to the test owing to its occasional alleged unreliability, it is incumbent upon all veterinary surgeons applying it to avoid risks of this kind, which would only tend to undermine the confidence which the proper use of tuberculin undoubtedly merits.—Yours faithfully, G. H. Wooldridge.

Royal Veterinary College, Camden Town.
February 12th, 1923.

The Editor begs to acknowledge the receipt of the following:—

Communications from Messrs. C. Elphick (Newcastle), G. Mayall (Bolton), D. S. Rabagliati (Ministry of Agriculture, Egypt), and Captain R. F. Wall (London). Report from Mr. J. Bishop (Perth).

Army Veterinary Service.

London Gazette—War Office—Regular Forces.

February 6th.—Temp. Lieut.-Col. H. W. Pitchford, C.M.G., F.R.C.V.S. (Lieut.-Col. Natal Def. Force), relinquishes his temp. commission on completion of service (December 31st, 1922), and retains rank of Lieut.-Col.

Diseases of Animals Acts, 1894 to 1914. Summary of Returns.

Period.	Rabies. Cases Confirmed. Dogs.	Rabies. Cases Confirmed. Other Animals.	Anthrax. Outbreaks confirmed.	Anthrax. Animals attacked.	Foot-and-Mouth Disease. Outbreaks confirmed.	Foot-and-Mouth Disease. Animals slaughtered as diseased or exposed to infection.	Glanders (including Farcy).* Outbreaks reported by the Local Authorities.	Glanders (including Farcy).* Animals attacked.	Parasitic Mange.* Outbreaks reported by the Local Authorities.	Parasitic Mange.* Animals attacked.	Sheep Scab. Outbreaks reported by the Local Authorities.	Swine Fever. Outbreaks confirmed.	Swine Fever. Swine slaughtered as diseased or exposed to infection
GT. BRITAIN.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Week ended 3rd Feb., 1923	...	...	16	17	1	2	1	1	45	61	30	33	14
Corresponding Week in 1922	...	...	8	10	266	9308	...	...	52	78	30	13	2
1921	1	...	20	21	...	144	...	...	107	156	39	20	4
1920	...	...	8	8	6	367	...	...	173	314	29	38	14
Total for 5 weeks, 1923 ...	...	...	75	81	1	175	1	1	159	249	153	175	43
Corresponding period in 1922	...	...	53	58	299	9562	..	...	257	417	210	123	42
1921	10	1	83	101	21	2143	...	...	483	769	180	132	33
1920	2	...	43	50	24	1417	3	6	825	1559	140	223	82
IRELAND.									Outbreaks				
Week ended 3rd Feb., 1923 ...			...	...	...	...	...	...	5	6	3	9	
Corresponding Week in 1922 ...			...	...	...	...	...	...	8	2	6	17	
1921 ...			...	...	...	21	..	...	...	15	2	20	
1920 ...			...	...	...	...	1	2	4	15	1	2	
Total for 5 weeks, 1923			...	...	...	...	...	...	14	25	22	97	
Corresponding period in 1922 ...			...	...	...	...	...	...	30	21	35	160	
1921 ...			...	...	1	35	...	...	14	59	5	37	
1920 ...			...	...	...	...	1	2	21	51	1	4	

Note.—The figures for the current year are approximate only. *Excluding outbreaks in Army horses.

Note.—The figures for the current year are approximate only.